## CONTENTS

| Preface   | v   |
|---|-----|
| Space: New Opportunities for all People (Invited Lecture)   |     |
| R. Gibson I. SPACE SYSTEMS  | 1   |
|   |     |
| The Concept of Autonomous Flight Management System for Future Spacecraft T. Tanabe, M. Harigae and N. Tomita  | 3   |
| The NASA Automation and Robotics Technology Program L. B. Holcomb and M. D. Montemerlo  | 11  |
| Enhanced Performance for the Manned Maneuvering Unit P. E. Bingham  | 19  |
|   | 13  |
| Definition Status of the US Space Station System M. K. Craig  | 27  |
| The Columbus System - Objectives and Design F. Longhurst, J. Graf, G. Bolton, J. Majus and W. Wienss  | 33  |
| Japanese Experiment Module (JEM) Preliminary Design Status M. Saito, K. Higuchi and K. Shiraki  | 47  |
| The Space Station Overview  |     |
| J. D. Hodge and W. P. Raney   | 55  |
| International Commonality for Space Station W. P. Fedor, R. D. Waiss and M. Baune   | 63  |
| Engineering the Voyager Uranus Mission  |     |
| R. P. Laeser  | 75  |
| Columbus Future Evolution Potential G. Altmann, G. Rausch and H. Sax  | 83  |
| II. SPACE TRANSPORTATION SYSTEMS  |     |
| Trends in Space Transportation  |     |
| R. F. Brodsky and M. G. Wolfe   | 105 |
| Advanced Space Propulsion Concepts D. George  | 113 |
| The Single-Stage Reusable Ballistic Launcher Concept for Economic Cargo   |     |
| Transportation  D. E. Koelle and W. Kleinau   | 125 |
| A Model Test Vehicle for Hypersonic Aerospace Systems Development H. Grallert, G. Cucinelli and M. Rigault  | 131 |
| III. ASTRODYNAMICS AND SPACE EXPLORATION  |     |
| Satellite Autonomous Navigation Using NAVSAT GEO + HEO Configuration C. Carnebianca, G. Solari, A. Cramarossa, G. Rondinelli, J. Deza and C. Reines | 143 |
| A Formulation for Studying Dynamics of N Connected Flexible Deployable Members  | 143 |
| A. M. Ibrahim and V. J. Modi  | 151 |
| Investigation of Attitude Motion of the Salyut-7 Orbital Station for Long Time Intervals  |     |
| V. A. Sarychev, M. Yu, S. P. Kuz'min, V. V. Sazonov and T. N. Tyan  | 165 |
| The DORIS Orbitography and Positioning System: The DORIS/SPOT 2 Mission B. Laborde  | 193 |
| The Consultative Committee for Space Data Systems (CCSDS) Planned and Potential Use of the Recommendations  |     |
| H. Kummer   | 199 |

## IV. APPLICATIONS

| Results of SPOT 1 Images: Quality Assessment Program G. Begni, B. Boissin and M. Leroy   | 207 |
|--|-----|
| TOPEX/POSEIDON: An International Satellite Oceanography Mission W. F. Townsend and JL. Fellous   | 213 |
| Higher Resolution Satellite Remote Sensing and the Impact on Image Mapping A. H. Watkins and J. M. Thormodsgard                        | 221 |
| A.G.H.F. A Modular Facility for the 90s<br>C. Roulle, D. Valentian, W. Biemann, P. Clancy and P. Behrmann                              | 233 |
| Analysis of Microgravity Measurements Performed During Dl<br>H. Hamacher, R. Jilg and U. Merbold                                       | 241 |
| Pilot Program and Operational Users of CS-2 Communication Satellite in Ka-band<br>K. Hashimoto, M. Yamamoto, M. Iguchi and I. Yamazaki | 251 |
| Telesat Canada's Anik E Spacecraft  E. Bertenyi and R. Tinley  | 257 |
| Mobile Communications, Navigation and Surveillance  C. Rosetti   | 265 |
| Mobile Satellite Systems: A Review  J. L. McNally and R. W. Breithaupt   | 279 |
| Trends of the Antenna Systems On-Board New Generation Telecommunications Satellites P. De Vincenti                                     | 287 |
| The Space Activity as a Bridge Between the Young People and the High Technologies K. B. Serafimov                                      | 295 |
| Problems and Prospects for Educational Direct Broadcasting R. Chipman  | 299 |
| Predicting the Earth's Future  J. A. Dutton  | 305 |
| V. TECHNOLOGY  |     |
| Closed Brayton Solar Dynamic Power for the Space Station A. A. Pietsch and S. W. Trimble   | 313 |
| Space Power Development Impact on Technology Requirements J. F. Cassidy, T. J. Fitzgerald, R. I. Gilje and J. D. Gordon                | 323 |
| Space Power - Emerging Opportunities  H. W. Brandhorst   | 335 |
| Selecting Hydrocarbon Rocket Propulsion Technology  J. A. Martin   | 343 |
| Advanced Propulsion Activities in the USA P. W. Garrison   | 357 |
| Electric Propulsion Works in Japan Y. Nakamura and K. Kuriki   | 367 |
| Propulsion for the Space Station  V. R. Larson and S. A. Evans   | 379 |
| Hermes Thermal Protection System Overview  D. Chaumette and JC. Cretenet   | 391 |

